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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte PIERRE COTE, HAMID RABIE,
NICHOLAS ADAMS, HIDAYAT HUSAIN,
HENRY BEHMANN, STEVEN PEDERSEN, and
JASON CADERA

Appeal 2008-3026
Application 09/916,247
Technology Center 1700

Decided: December 12, 2008

Before BRADLEY R. GARRIS, CHUNG K. PAK, and
JEFFREY T. SMITH, *Administrative Patent Judges*.

SMITH, *Administrative Patent Judge*.

DECISION ON APPEAL

This appeal involves claims 26-36, the only claims pending in this application. We have jurisdiction under 35 U.S.C.

§ 134.

We AFFIRM

Appellants' invention is directed to a process for filtering water containing solids with membranes in a tank. The claimed process includes the backwashing with a chemical cleaner of one or more suction driven ultrafiltration or microfiltration membranes normally immersed in water containing solids that become dirty or fouled during normal operation. Representative independent claim 26, as presented in the Brief, appears below:

26. A process for filtering water containing solids with membranes in a tank comprising the steps of:

a) filling the tank with a feed water to be filtered to immerse the membranes;

b) creating a transmembrane pressure between a permeate side and a retentate side of the membranes, the retentate side of the membranes being in contact with the water in the tank at ambient pressure, the permeate side being subject to a negative pressure relative to the pressure of the water in the tank fluidly connected to a filtered permeate outlet, to generate a filtered permeate at the permeate outlet and a retentate in the tank;

c) aerating the membranes to dislodge solids from the membranes;

d) backwashing the membranes; and,

e) draining the tank of the retentate;

wherein

i) the steps above are performed in repeated cycles; and,

ii) the steps of backwashing the membranes and draining the tank in a cycle may be performed either before the other or partially or substantially simultaneously; and,

f) wetting the membranes at least once per week with a cleaning chemical having a selected concentration for a selected duration after performing step (b) in a first cycle and after or while performing step (e) in the first cycle, without returning to step (b) in the first cycle and before starting a subsequent cycle.

The Examiner relies on the following references in rejecting the appealed subject matter:

Smith	US 5,403,479	Apr. 4, 1995
Del Vecchio	US 6,331,251 B1	Dec. 18, 2001

Appellants appeal the rejections as follows: ¹

The Examiner rejected claims 26-36 under 35 U.S.C. § 103 as obvious over Smith and Del Vecchio. ²

The Examiner rejected claims 26-28, 31, and 34-36 under 35 U.S.C. § 103 as obvious over Del Vecchio.

¹ The Examiner has withdrawn the statutory double patenting rejection of claims 26-29, 31, and 33 and the obviousness type double patenting rejection of claims 26-36 (Ans. 4).

² The Examiner under a separate heading indicated that claims 29, 30, 32, and 33 were rejected over the combination of over Del Vecchio and Smith. Our response to this rejection has been incorporated into the discussion presented for this rejection because the combination of references is the same. All of Appellants' arguments in rebuttal to both rejections have been considered.

ISSUE

The Examiner finds that Smith and Del Vecchio describe methods for cleaning one or more membranes normally immersed in water containing solids in a tank that includes draining the tank during the cleaning process. (Ans. 5-10). The Examiner recognizes that Smith discloses the use of cleaning agents of varying concentrations for cleaning the membranes. (Ans. 5). The Examiner recognizes that Smith discloses that draining the tank during the cleaning process may not be necessary if the cleaning agents are controlled so as to not affect the permeate quality. (Ans. 6). The Examiner states that the frequency of the cleaning event can be optimized depending on the quality and quantity of water to be treated. (Ans. 4-9).

Regarding the rejections over the combined teachings of Smith and Del Vecchio, Appellants contend that Smith teaches away from the use of any tank draining step. (App. Br. 8). Appellants contend that the teachings in Smith are contrary to any combination with Del Vecchio. (App. Br. 9). Appellants contend that Figure 4 of Smith does not describe a process in which the tank is drained. (App. Br. 10). Appellants acknowledge that Del Vecchio describes a preferred embodiment wherein the deep cleanings occur over several hours. However, Appellants contend that it would not have been obvious to perform a cleaning process that takes several hours once per week if once per month is adequate.³ (App. Br. 11).

³ In response to the stated rejections, Appellants have addressed several claims under separate headings (identifying a specific claim or groups of claims). The discussion in the Brief for each of these claims is limited to the discussion of specific portions of the Smith reference and specific portions of the Del Vecchio reference. (App. Br. 11-20). After careful consideration of this discussion, it is determined that, for all the claims subject to these

Regarding the rejection over Del Vecchio, Appellants contend that Del Vecchio does not teach that varying the deep cleanings frequency achieves a particular result. (App. Br. 16). Appellants contend that the teachings of Del Vecchio would not lead to a cleaning frequency of at least once per week. (App. Br. 17). Appellants further contend that the parameters of the claimed invention are chosen to achieve a defined goal, a reduced rate of decline in the membrane permeability between recovery cleanings, whereas Del Vecchio teaches no goal to be achieved by proactively modifying the cleaning frequency. (App. Br. 17).

The question before us is: Did Appellants identify reversible error in the Examiner's rejections under § 103? We answer this question in the negative. The issue turns on whether a person of ordinary skill in the art would have recognized that membranes normally immersed in water containing solids for separating water from solids would have required periodic cleaning and therefore would have optimized the cleaning frequency during the separation process.

We have thoroughly reviewed each of Appellants' arguments for patentability. However, we are in complete agreement with the Examiner that the claimed subject matter is not patentable within the meaning of § 103 in view of the applied prior art. Accordingly, we will sustain the Examiner's rejections.

rejections, Appellants' principal argument is that the cited portions of the Smith and Del Vecchio references do not teach the subject matter of the independent claim 26. We have considered all of Appellants' allegations for patentability.

We make the following Findings of Fact (FF) from the record presented in this appeal:

- (1) Membranes are known for separating a permeate lean in solids from a feed water rich in solids. Membranes have a retentate side in fluid communication with the feed water and a permeate side at which permeate is collected. (Spec. 1).
- (2) Filtered feed water permeates through the walls of the membranes under the influence of a transmembrane pressure differential between the retentate side of the membranes and the permeate side of the membranes. (Spec. 1).
- (3) Solids in the feed water are rejected by the membranes and remain on the retentate side of the membranes. (Spec. 1).
- (4) It has been recognized that it is important to keep membranes used in such systems clean because, after some period of use, a fouling film can form on the membranes, thereby reducing the flow of permeate through the membrane. As the permeability of membranes decreases, the yield of the process similarly decreases or a higher transmembrane pressure is required to sustain the same yield. (Spec. 1; Smith, col. 1, ll. 1-30; and Del Vecchio, col. 1, ll. 33-43).
- (5) The solids present in the feed water in solution, in suspension or as precipitates may further include a

variety of substances, some not actually solid, including colloids, microorganisms, suspended solids, and poorly dissolved organic or inorganic compounds, and others. (Spec. 1; Smith, col. 1, ll. 33-52; and Del Vecchio, col. 1, ll. 33-43).

- (6) To prevent the decreased yield of the process or the increased transmembrane pressure from becoming unacceptable, the membranes must be cleaned. (Spec. 1; Smith, col. 1, ll. 1-30; and Del Vecchio, col. 1, ll. 33-43).
- (7) Chemical cleaning solutions are known to be utilized for cleaning surfaces of the membranes. (Spec. 2-3; Smith, col. 12, ll. 9-19; and Del Vecchio, col. 3, ll. 34-38).
- (8) Smith discloses that the concentration of the cleaning fluid and the duration of the contact of the cleaning fluid with the membrane are variable and has a dominant affect on the cleaning process. (Smith, col. 14, ll. 6-17; Figure 1).
- (9) Smith discloses that depending upon the toxicity of the bacterial population to be cleaned, as little as 10 ppm of the cleaning fluid can be effective. (Smith, col. 14, ll. 34-36)
- (10) Smith's Figure 4 depicts plotted results of a pilot plant test in which the effect of various back-flushes utilizing various solution (i.e., chemical solution/water/permeate),

each having a duration of 30 min, and carried out sequentially. (Smith, col. 18, ll. 30-40).

- (11) Smith discloses that draining the tank is not necessary during the cleaning process and is an undesirable alternative. (Smith, col. 10, ll. 64-68).
- (12) Del Vecchio discloses the membranes should be subject to periodic pulse cleanings and deep cleanings. (Del Vecchio, col. 9, ll. 48-56).
- (13) Del Vecchio discloses the pulse cleanings can be conducted for varying time intervals including frequency and duration. (Del Vecchio, col. 9, l. 49 to col. 10, l. 8).
- (14) Del Vecchio discloses cleaning membranes which comprises draining the water to be filtered from a compartment containing the membranes, refilling the compartment with a cleaning chemical, soaking the membranes with the cleaning chemical for a period of time required for the cleaning, draining the cleaning chemical from the compartment, and then re-filling the compartment. (Del Vecchio, col. 11, l. 47 to col. 12, l. 48).
- (15) Del Vecchio discloses that the deep cleaning can be conducted for varying time intervals including frequencies and durations depending on the needs of the system and the rate at which the membranes are fouled. (Del Vecchio, col. 12, ll. 11-29).

- (16) Del Vecchio discloses despite significant advances in the art of filter cleaning and the purported ability of such proposed systems to prolong the throughput rate of the membranes used as filters, it has been discovered that, in some instances, the membranes must eventually be removed from the process for a thorough cleaning such as a deep chemical cleaning. (Del Vecchio, col. 2, ll. 57-63).
- (17) Del Vecchio discloses there are several drawbacks to performing deep cleanings including the need to remove a filter from the system. The process is time consuming, expensive, labor intensive, and often requires that the system be at least partially shut down during the cleaning process while the filter is removed. (Del Vecchio, col. 2, ll. 57-63).

PRINCIPLES OF LAW

Under 35 U.S.C. § 103, the factual inquiry into obviousness requires a determination of: (1) the scope and content of the prior art; (2) the differences between the claimed subject matter and the prior art; (3) the level of ordinary skill in the art; and (4) secondary considerations, if any. *See Graham v. John Deere Co.*, 383 U.S. 1, 17-18 (1966). “[A]nalysis [of whether the subject matter of a claim is obvious] need not seek out precise teachings directed to the specific subject matter of the challenged claim, for a court can take account of the inferences and creative steps that a person of ordinary skill in the art would employ.” *KSR Int’l Co. v. Teleflex Inc.*,

127 S. Ct. 1727, 1740-41 (2007). “[I]f a technique has been used to improve one device, and a person of ordinary skill in the art would recognize that it would improve similar devices in the same way, using the technique is obvious unless its actual application is beyond his or her skill.” *Id.* See also *DyStar Textilfarben GmbH & Co. Deutschland KG v. C.H. Patrick Co.*, 464 F.3d 1356, 1361 (Fed. Cir. 2006) (“The motivation need not be found in the references sought to be combined, but may be found in any number of sources, including common knowledge, the prior art as a whole, or the nature of the problem itself.”).

ANALYSIS

Applying the preceding legal principles to the Factual Findings (FF) in the record of this appeal, we determine that the Examiner has established a prima facie case of obviousness, which prima facie case has not been adequately rebutted by Appellants’ arguments. As shown by FF (1-6) above, it has been recognized that it is important to keep membranes used in such systems clean because, after some period of use, a fouling film can form on the membranes, thereby reducing the flow of permeate through the membranes. The occurrence of reduced flow through the membranes is recognized by the reduced yield of the permeate and/or the need for a higher transmembrane pressure to sustain the same permeate yield. (FF (4)). Chemical cleaning solutions were known to have been utilized in cleaning membrane filtering systems to prevent the decreased yield of the filtered product or the need for a higher transmembrane pressure. (FF (7)). Therefore, a person of ordinary skill in the art would have recognized that the concentration of the cleaning fluid, the duration of the contact of the

cleaning fluid with the membranes, and the cleaning frequency affect the effectiveness and efficiency of the membranes in the above fluid separation process. (FF (8-9)). In other words, a person of ordinary skill in this art would have recognized that the cleaning frequency, duration of the cleaning, and the concentration of the cleaning solution utilized are all result effective variables. Accordingly, it would have been prima facie obvious to one of ordinary skill in the art to employ the optimum frequency, duration of the cleaning and concentration of the cleaning fluid to achieve optimal performance of the filtering system. Appellants have not established that the scheduled cleaning events specified by the claimed invention achieve unobvious and unexpected results.

As set forth above (FF (16)), Del Vecchio is evidence that a person of ordinary skill in the art of filter cleaning would have recognized that the membranes must eventually be removed from the filtering process for a thorough cleaning such as a deep chemical cleaning. A person of ordinary skill in the art would have recognized that there are several drawbacks to performing deep cleaning, including the need to remove a filter from the system. (FF (17)). The deep cleaning process is time consuming, expensive, labor intensive, and often requires that the system be at least partially shut down during the cleaning process. (FF (17)). A person of ordinary skill in the art would have had sufficient skill to have selected a more frequent cleaning cycle if he were to avoid the drawbacks associated with the deep cleaning on a more frequent basis.

Appellants' arguments regarding the failure of Smith to disclose draining the tank for cleanings are not persuasive. As set forth above, the record establishes that a person of ordinary skill in the art would have

recognized that it may have been necessary to drain the tank periodically for the purpose of performing deep cleanings. Smith's Figure 4 is exemplary that cleaning cycles can occur in repetition. A person of ordinary skill in the art would have understood from the entire disclosures of Smith and Del Vecchio that several cleaning events could occur subsequent to one another. (FF (4-17)).

The Examiner finds that the frequency of the cleaning event can be optimized. (Ans.4-9). We agree. Several factors must have been taken into account when determining the proper cleaning intervals. A person of ordinary skill in the art would have understood that these factors included the quality and quantity of water to be treated, the concentration of the cleaning solution, the duration of the cleaning cycle, and the need for periodic deep cleaning cycles. (FF (4-9, 15)). Appellants have not asserted that a person of ordinary skill in the art would have been unable to recognize that these factors would have an affect on the cleaning efficiency and effectiveness. Appellants have not asserted that the claimed invention achieves an unexpected result.⁴

Del Vecchio is further evidence that persons of ordinary skill in the art would have recognized that both pulse cleaning and deep cleanings can be conducted for varying time intervals including frequency and duration. (FF (12-17)). As set forth above, persons of ordinary skill in the art would have

⁴ The issue presented in our prior Decision 2006-2492 was for an anticipation rejection. In this prior Decision, we did not make a determination as to whether the Smith and Del Vecchio references would have rendered the claimed subject matter obvious to a person of ordinary skill in the art.

recognized that the quality and quantity of water to be treated and the concentration of the cleaning solution would have an affect on the frequency and duration of the cleaning events. (FF (4-9)). A person of ordinary skill in the art would have recognized that the rate of decline of a membrane that is fouled is faster than non-fouled membrane. Thus, a person of ordinary skill in the art would have reasonably selected cleaning intervals to achieve optimal performance of the filtering system. As set forth above, Appellants have not established that the scheduled cleaning events specified by the claimed invention achieve unobvious and unexpected results.

We do not find Appellants' allegations for patentability of the dependent claims persuasive for the reasons set forth above and in the Answer.

After consideration of the entire record, we determine that a person of ordinary skill in the art would have recognized that membranes normally immersed in water containing solids would have required periodic cleaning and therefore would have optimized the cleaning frequency for cleaning the membranes used in the fluid separation process. For the foregoing reasons and those stated in the Answer, we affirm the rejections presented in this appeal.

ORDER

All the rejections of the claims on appeal are affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(1)(iv).

AFFIRMED

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